

selective biochemistry of the Betz cell. This would be hard to detect since it is only in the area of hormonal secretion that we have an "endogenous bioassay."

The syndromes associated with malignant disease are many and varied. They are worthy of careful attention by the physician, the clinical investigator and the biologist alike.

## An Illogicity to Be Avoided

SINCE HEALTH IS BECOMING a major goal of this nation, if not of the world, it may be expected that all sorts of efforts and approaches will be made to lessen if not overcome the disparity between expectations and available resources. It is inevitable that full use will be made of whatever statistical data are available concerning needs and resources, and that what is coming to be known as systems analysis will be tried as a means to find more efficient ways of bringing resources to bear upon whatever is determined to be the need. This new technology, augmented (as it is certain to be) by automated data processing and computerization, is full of promise for improved and more efficient health care, but this promise depends for its fulfillment upon a recognition that health is an individual proposition and not something to be handled simply as a matter of statistical probability.

The biological distribution curve gives expression to this essential point. It is well recognized that no two specimens of a biological species are ever exactly alike. If any characteristic such as weight or height is measured, a distribution curve may be constructed by plotting numbers of specimens against their various heights, weights or whatever. From this curve such things as averages, means, modes and probabilities may be calculated and much useful information may be derived about the sample as a whole. But, most significantly, none of these calculations can predict where upon the curve any particular specimen of the sample will be found, except in terms of statistical probability.

An important illogicity occurs whenever it is assumed that the characteristics of any individual specimen are actually the same as the average, or the mean, or the mode or even a statistical prob-

ability which may be derived from the distribution curve. The fact is that each human being is genetically unique and also unique in his life experience, and because of this there is a reasonable chance that his ailments will be either unique or uniquely expressed. This biologic and sociologic reality is well known to physicians and patients and accounts for much of their opposition to systematization in medical care.

Illogicity of this sort must not be allowed to creep into planning for health services. As costs increase and as the extent of the disparities between expectations and resources becomes more accurately assessed by modern statistical technology, there is apprehension that the illogical step of equating the human recipient of health care services with the statistical probability will be taken by systems-oriented planners who either do not recognize or underrate the uniqueness of human beings. The danger is that the needs of a health care delivery system for economic efficiency somehow may be permitted to take precedence over the needs of the patients which the system was presumably designed to serve. The aim to be achieved is somehow to blend (1) the needs for economy and efficiency, (2) the capabilities of modern data processing and systems analysis, and (3) the needs for individualization of health care services which derive from the biologic and sociologic uniqueness of each person.

The expectations for health, in the nation and the world, can be realized only if this most important illogicity in planning for health care services is recognized and avoided.

## A Treatment For Viral Infections?

FOR ALMOST A quarter of a century, physicians have been able to treat many bacterial infection effectively with antimicrobial drugs. This stands in sharp contrast to our inability to influence many human viral diseases which constitute a large proportion of patients' acute complaints. The resulting frustration has, at times, led to the unwarranted and undesirable use of antibacterial drugs for the "prevention" of hypothetical complications of viral infections.

The discovery of interferon in 1957 by Isaacs and Lindemann\* provided a ray of hope. Here was a potent inhibitor of the replication of many different viruses and one which was non-toxic for host cells. If such material could be produced on a large scale, it might be the long hoped-for universal antiviral drug. Regrettably, the early hopes and expectations were not fulfilled. The pronounced host-specific effect of interferon limited its potential application and the small yield of interferon in laboratory systems posed apparently insuperable difficulties for commercial production. For these and other reasons, *exogenous* interferon has been largely abandoned as a potential antiviral drug.

On the other hand, it was discovered that a wide variety of substances was capable of inducing the formation or release of *endogenous* interferon made by the host's own cells. Some inducers were relatively simple molecules, some were non-antigenic and could therefore be given repeatedly, many were non-toxic. This provided a powerful new stimulus for the investigation of the physical, chemical, and biological properties of interferon and its potential in therapy. Elsewhere in this journal, Dr. T. Merigan, a leading investigator of interferon, presents a detailed and critical appraisal of some recent developments in this area.

It seems probable that endogenous interferon, stimulated by virus infection, plays an important role in limiting viral proliferation in an infected tissue and thus limiting injury to tissue. Interferon appears to be an important mechanism in bringing viral disease to an end. By contrast, preformed antibody (for example, after vaccination or post infection) may prevent infection by a given specific virus, but plays little part once an infection has established itself. It is tempting to believe that stimulation of endogenous interferon by non-toxic and non-immunogenic inducers could be employed in many viral infections to abort or prevent disease. In view of the broad spectrum of viruses suppressed by interferon, it would not even be necessary to formulate a specific viral diagnosis before employing this agent—at times an appealing thought. These possibilities are so attractive that large pharmaceutical manufacturers are intensively pursuing research in these directions. In the immediate future, however, such a universal antiviral compound is not in sight for the practitioner. Most clinical trials with exogenous interferon have given

marginal results and some of the more dramatic claims for the clinical efficacy of interferon-inducers (especially from the U.S.S.R.) require confirmation.

For the molecular biologist, interferon offers an exciting challenge, permitting glimpses into the cell's mechanisms which transmit information and control synthesis of viral components. It appears at present that interferon acts upon ribosomes where active protein synthesis takes place. It is reasonable to predict that knowledge about the molecular biology of interferon will accumulate faster than its practical application in medicine. Nonetheless, the dream of a universal antiviral treatment may come true through progress in this field of investigation.

## Medicine and Human Behavior

AS THIS IS WRITTEN another assassin's bullet has snuffed out the life of another American of courage and outspoken conviction. Perhaps the assassin was demented, perhaps an opportunist, or perhaps a person of courage with his own peculiar conviction. An anguished nation is asking itself why, what is wrong, and how can violence be curbed, whatever its cause. There is something awful about the present capability of a minority of one human being to affect the lives of so many, whether his finger is on the trigger of a gun or on a button which could unleash a nuclear holocaust.

This is not the place to explore the extent to which a minority, whether an individual or a group, whether advantaged or disadvantaged, whether black, white or some other color or race, should have the power or the right to impose its will upon a civilized nation, upon the civilized world, or even upon a simple majority of whatever group. Nor is this the place to examine the concept of the protest—that theory which says that if I believe I know what is right then I have a responsibility to bring about what I believe to be right even if I have to violate a law to do so, and that what I am doing is so right and so important that it doesn't matter if I have to deny others the same rights and privileges I claim for myself in order to get it done. This concept not only underlies the illegal protest, whether violent or non-violent, but it is also the blind conviction of extremists of both the political right and left.

\*Isaacs, A., and Lindemann, J.: Virus Interference, I. Interferon. Proc. Roy. Soc. (London), 147:258-267, 1957.